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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/659,599	09/11/2000	Glenn H. McGall	2719.2001-000	4766

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EXAMINER	
EPPS, JANET L	
ART UNIT	**PAPER NUMBER**
1635	29

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/659,599	MCGALL, GLENN H.	
	Examiner	Art Unit	
	Janet L. Epps-Ford, Ph.D.	1635	

-- Th MAILING DATE of this communication app ars n th cover sheet with th correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23 and 30-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23 and 30-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1-23-03 has been entered.

Response to Arguments

2. Applicant's arguments filed 1-23-03 with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-23, and 30-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGall et al. (5,412,087; US'087) in view of McGall et al. (WO 98/39348 A1; WO'98).

McGall et al. provide methods and compositions of matter for immobilizing oligonucleotides and other biological polymers on predefined regions of a surface of a solid support. The methods involve activating regions of a surface by attaching to the surface a thiol functional group protected with a photochemical protecting group so that the thiol has very low reactivity for other functional groups reactive with thiols. The protected thiol is convertible by

irradiation to a fully reactive thiol capable of immobilizing a desired biological polymer such as a nucleic acid, protein, or polysaccharide. Predefined regions of the surface are selectively irradiated to convert the protected thiols in the predefined regions to reactive thiol groups. The desired biological polymers subsequently can be immobilized on the activated regions of the surface. The methods taught by McGall et al. allows for the formation of patterned surfaces having preselected reactivities. For example, by using lithographic techniques known in the semiconductor industry, light can be directed to relatively small and precisely known locations on the surface. Thus, the present invention can be used to activate discrete, predetermined locations on the surface for attachment of biological polymers. The resulting surface will have a variety of uses. For example, in one embodiment, the method involves the light-directed immobilization of oligonucleotides on a glass surface derivatized with a caged thiol reagent. The method can be used to fabricate large arrays of oligonucleotide probes (col. 3, lines 1-45).

The caging groups used in the methods of McGall et al. are preferably photoactivatable. Preferably, the photosensitive cages will be activatable by low energy ultraviolet or visible light. Many, although not all, of the photosensitive protecting groups are aromatic compounds. More preferably, the photosensitive protecting group will be a nitro benzylic compound, such as o-nitrobenzyl or benzylsulfonyl groups. In a preferred embodiment, 6-nitroveratryloxycarbonyl (NVOC); 6-nitropiperonyloxycarbonyl (NPOC); alpha, alpha-dimethyldimethoxybenzyloxy-carbonyl (DDZ), methyl 6-nitroveratryloxycarbonyl (MenVOC), methyl-6-nitropipe ronyloxycarbonyl (MeNPOC), or 1-pyrenylmethyl is employed. McGall et al. further state that many photosensitive protecting groups are suitable for use in their method.

McGall et al. in regards to regions of the solid support utilized in their disclosed methods, once the surface is covered with a plurality of caged thiol groups, selected regions of the surface may be irradiated to provide free thiols on the surface. In a preferred embodiment, the radiation is UV, near IR, or visible light. The light source may be coherent or noncoherent. In some embodiments, the exposed area is less than about 1 cm^2 or less than about 1 mm^2. In preferred embodiments the irradiated area will be composed of a pattern of smaller, discrete irradiated areas, each of which is less than about 10,000 μm^2or, more preferably, less than about 100 μm^2. Preferably, each individual synthesis site in the pattern is about 50 to 500 μm^2. Spaces between activated regions are not critical and will generally be greater than about 1 μm^2. Exposure of the surface to light will typically be carried out with a suitable mask using photolithographic techniques well known in the semiconductor industry (col. 8, lines 50-65). McGall et al. further teach the use of wavelengths between 280 and 420 nm in their methods (see Table 1, col. 8).

However, McGall et al. (US'087) do not disclose the specific photolabile protecting groups as recited in the instant claims.

McGall et al. (WO'98) disclose photocleavable groups useful as linking groups in solid phase synthesis of oligonucleotides and polypeptides. The compounds that are useful in the methods of this reference have a structure according to the following general formula: Ar-C(R1)(R2)-O-C(O)- , wherein Ar is an optionally substituted fused polycyclic aryl or heteroaromatic group or a vinylogous derivative thereof , and R1, and R2 are independently H, optionally substituted alkyl, alkenyl, alkynyl or aryl (see page 2, lines 10-19). One representative fused polycyclic aromatic hydrocarbon includes naphthalene, a two condensed rings (see page 8, line 25, and page 5, line 8). The term "optionally substituted" refers to the

presence or lack thereof, of a substituent on the group being defined. When substitution is present the group may be mono-, di- or tri-substituted, independently, with alkyl, lower-alkyl, or a nitro group (*inter alia*; see page 6, lines 1-4). Therefore, a preferred embodiment of the photocleavable groups of McGall et al. comprises a compound of the general Ar-C(R1)(R2)-O-C(O)- , wherein Ar is a naphthalene group, optionally substituted with a nitro group, and further comprising wherein R1 or R2 is either H, or a lower alkyl group (i.e. a methyl group). This preferred embodiment of McGall et al. encompasses the structure of the photolabile group of the present invention, specifically, alpha-methyl-8-nitronaphthylmethoxycarbonyl MeNMOC.

The invention of McGall et al. also provides compositions of the molecular formula Ar-C(R1)(R2)-O-C(O)-M, wherein Ar, R1, and R2 are defined as above, and wherein M is a monomeric building block selected from amino acids, nucleic acids, nucleotides, nucleosides, monosaccharides, and the like (see page 9, lines 9-13).

It would have been obvious to one of ordinary skill in the art at the time of filing to modify the teachings of McGall et al. (US'087) et al. with the teachings of McGall et al. (WO'98), in the making of the compounds according to the present invention having a formula according to M-Y, and the methods of attaching a molecule to a support according to the present invention. One of ordinary skill in the art would have been motivated to make this modification since the photolabile protecting groups of McGall et al.(WO'98) are expressly disclosed as being useful in providing compounds according to M-Y (see page 9, lines 9-13) that can be used to generate a compound comprising a chain of component molecules attached to a solid support (see page 12, lines 26-32), particularly as protecting groups in chemical synthesis, preferably in the solid phase preparation of oligonucleotides (see page 2, lines 10-12).

Moreover, in regards to the non-polyclyclic (i.e. benzylic) photolabile protecting groups specifically recited in the instant claims, it would have been obvious to modify the teachings of McGall et al. (US'087) with other nitrobenzylic derivatives, since McGall et al. clearly states that nitro-benzyl photosensitive groups are particularly suitable for use in their disclosed methods, and the photolabile protecting groups of the present invention are all nitro-benzylic derivatives. One of ordinary skill in the art seeking alternative methods for synthesizing oligonucleotides, would have been motivated to substitute one functionally equivalent photosensitive (or photolabile) nitrobenzylic derivative group, as disclosed in the prior art as useful for the same purpose, for another equivalent photosensitive group.

Therefore, the invention as a whole would have been *prima facie* obvious over McGall et al. (US'087) in view of McGall et al. (WO'98).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janet L. Epps-Ford, Ph.D. whose telephone number is 703-308-8883. The examiner can normally be reached on M-T, Thurs-Friday 9:00AM to 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John LeGuyader can be reached on (703)-308-0447. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3014 for regular communications and 703-746-5143 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Janet L. Epps-Ford, Ph.D.
Examiner
Art Unit 1635

JLE
April 5, 2003

SEAN McGARRY
PRIMARY EXAMINER
1635